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ABSTRACT

This study evaluated the effectiveness of instructional aids designed to improve the test scores of field-dependent students enrolled in an introductory, community college-level, geology course for non-science majors. Prior to beginning course instruction, 36 students were classified as field-dependent on the basic scores from the Witkin Embedded Figures Test. These students were then divided into a treatment group (N=18) and a control group (N=18). Instruction was the same for both groups of students, with the exception that students in the treatment group received instructional aids designed to enhance their ability to discern structural features in a natural formation. At the end of one semester of instruction, field-dependent students in the treatment group scored significantly higher on an achievement test than did field-dependent students in the control group. This finding indicates that neither students nor teachers need to change their learning and teaching styles. With a few additional instructional aids where needed, for field-dependent students in specific situations, scores on tests can be significantly improved. (JN)

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The Effects of Instructional Aids on the Achievement of Community College Students Enrolled in A Geology Course

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The Effects of Instructional Aids on the Achievement of Community College Students Enrolled in A Geology Course

Introduction

This study evaluated the effectiveness of instructional aids designed to improve test scores of field-dependent students enrolled in a community college introductory geology course for non-science majors. Prior to the beginning course instruction, 36 students were classified as field-dependent on the basis of their scores on the Witkin Embedded Figures Test (Witkin, 1977). These students were then divided into a treatment group and a control group of 18 each. The treatment group received instructional aids to enhance their ability to discern structural features in a natural formation. At the end of the semester of instruction, field-dependent students in the treatment group scored significantly higher on the geological achievement test than the field-dependent students in the control group.

Field-dependent students are handicapped in science activities that require the skill to discern an object surrounded by distractions in the background. This can affect their science achievement and their attitudes toward science (Crow and Piper, 1983). Various instructional procedures have been designed and tested to improve the performance of field-dependent students. Skymansky and Yore (1980) explored structuring the learning environment to match the learning styles of students. Strawitz (1984) evaluated an instructional procedure designed to teach

field-dependent and field-independent students to control variables and transfer this ability to new tasks.

Purpose

This study evaluated the effectiveness of instructional aids designed to improve the performance of field-dependent students studying a geological unit. A geological achievement test was used to determine the effectiveness of the instructional aids.

Subjects

The subjects of this study were 36 non-science majors enrolled in a community college introductory geology course. The subjects were not randomized, and not all the subjects were enrolled in the same semester. Data were collected over two semesters.

Procedures

Prior to instruction at the beginning of the semester, the Witkin Embedded Figures Test (Witkin, 1977) was given to each student enrolled in the introductory geology classes. The test uses a hidden figure format with scores ranging from 0 to 18. Students in two different classes who scored between 0 to 8 were determined to be field-dependent. The field-dependent students in

one class were designated as the treatment group, and the field-dependent students in the other class were designated as the control group.

The topic for the geological unit selected for evaluating the instructional aids was on structural features such as faults, folds, and non-conformities.

The instruction was the same for both groups of subjects with the exception that instructional aids were used with the treatment group. The following aids were added for the treatment group:

1. After the structural features were verbally defined, slides of the features as they appear in nature were shown on the chalkboard.

2. Outlines of the difficult to discern features were drawn over the projected slides onto the chalkboard.

3. The slide projector was turned off, and the remaining outline on the chalkboard was viewed.

4. The slide projector was turned on again, and the same slide was viewed with the drawn outline of the features.

This procedure was repeated with 20 slides. During a field trip a week following instruction, structures were pointed out and outlined using appropriate field techniques.

5. The treatment group was given both correct and possible incorrect identification of geological structures during these procedures. Case (1975) and Strawitz (1984) found that teaching strategies designed to teach students to resist misleading perceptual cues are more successful if they include both correct

and incorrect responses.

The effects of the five instructional aids were evaluated through the use of a geological achievement test consisting of 36 questions. The reliability of the test developed by the investigators is .82 as determined by the alpha coefficient.

Results

Descriptive statistics are shown in Table 1. The data were analyzed using a one-way analysis of variance. The F value, as shown in Table 2, was significant at <.05 level of significance. The field-dependent students in the treatment group scored significantly higher than the control group on the geological achievement test.

Discussion

The purpose of this investigation was to develop and evaluate the use of minimal instructional aids for field-dependent students studying a unit in geology that required field-dependent skills. These are studies that investigate the modification of students' learning styles in order to assist them in becoming less field-dependent. Other studies investigate modifying teachers' teaching styles to become less field-dependent. This investigation points out that neither students nor teacher need change learning and teaching styles. With a few additional

instructional aids for field-dependent students in specific situations where needed, scores on tests can be significantly improved.

Geology can be a difficult course of study for field-dependent students when traditional methods of viewing pictures and drawings of natural features are used without aids to help students cope. Even a field trip may not be successful without discussing correct and incorrect responses. Science teachers could greatly improve test scores of students who previously were low achievers in geology and whose attitudes toward geology were unfavorable with minimal effort.

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TABLE 1

Descriptive Statistics - Achievement Test

Group	Mean	Standard Deviation
Treatment	82.15	8.98
Control	66.23	20.85

TABLE 2

Results of Analysis

	SS	DF	MS	F
Between	40776.36	1	20388.18	115.26*
Within	6368.00	33	176.89	
Total	47144.36			

*Significant at <.05

References

Case, R. "Gearing the Demands of Instruction to the Developmental Capacity of the Learner," Review of Educational Research, 1975, 45, 59-87.

Crow, Linda and Piper, Martha K. "A Study of the Perceptual Orientation of Community College Students and Their Attitudes toward Science as They Relate to Science Achievement," Journal of Research in Science Teaching, 1983, 20 (6), 537-542.

Shymansky, James and Yore, Larry. "A Study of Teaching Strategies, Student Cognitive Development and Cognitive Style as They Relate to Student Achievement in Science," Journal of Research in Science Teaching, 17, 369-372.

Strawitz, Barbara. "Cognitive Style and the Acquisition and Transfer of the Ability to Control Variables," Journal of Research in Science Teaching, 1984, 21 (2), 133-142.

Witkin, H. A., Oltman, P. K., Raskin, E., and Karp, S. A. A Manual for the Embedded Figures Tests, Palo Alto: Consulting Psychologists Press, 1977.